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| 65913 | 7590 | 06/26/2009 | EXAMINER | |
| NXP, B.V. | | | CHHAYA, SWAPNEEL | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/560,447 | HESEN ET AL. | |
| | Examiner | Art Unit | |
| | SWAPNEEL CHHAYA | 2895 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 27 March 2009.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-10 and 12-16 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-10 and 12-16 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 3/27/2009 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ . | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 3-7, 9, 10, 11, 12, 13, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Coldren (U.S. Patent 4252864).

Regarding claim 1.

1.

lead frame comprising:

a frame; having a

first and a second connection conductors respectively connected to the frame and provided with a non-engaging end portion within a perimeter of the frame, the end portion of the second connection conductor being positioned adjacent an extension of the first connection conductor, the second connection conductor configured to bend along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion to position the end portion of the second connection conductor opposite the first connection conductor to secure, a semiconductor element (16) between said

connection conductors. (Fig. 1-5 column 3 lines 15-20 55-67 column 4 lines 1-10)

Regarding claim 2. A lead frame as claimed in claim 1, characterized in that the end portion of the second connection conductor (72') is positioned has been brought to a position opposite the position of the semiconductor element and bent by bending along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion. (Fig. 4-5 column 4 lines 1-10)

Regarding claim 3.

A method of manufacturing a semiconductor

device comprising the steps of:

- providing a semiconductor element having a first and a second electric connection region which connection regions are situated at opposite sides of the semiconductor element (Fig. 1-5 column 4 lines 1-65)

-providing a lead frame having first and second connection conductors respectively connected to a frame and having freely extending end portions the end portion of the second conductor being bent along a bending axis that is at an oblique angle with respect to a longitudinal axis of the end portion and extending over the end portion of (new matter)the first conductor (Fig. 1-5)

- fitting the semiconductor element between the freely extending end portions of the first

connection conductor and the second connection conductor using connection means are used to make electro-conductive connections between the connection regions and the end portions. (Fig. 1-5 column 4 lines 1-65)

Regarding claim 4.

A method of manufacturing a semiconductor device comprising

the steps of:

- providing a semiconductor element (16) having a first and a second electric connection region which connection regions are situated on opposite sides of the semiconductor element; (Fig. 1 column 3 lines 1-15)
- providing a lead frame having a frame with a first and a second connection conductor which connection conductors are each connected to the frame and provided with an exposed freely extending end portion; (Fig. 4 column 3 lines 25-30)
- applying the semiconductor element to the end portion of the first connection conductor an electro-conductive connection between the first connection region and the end portion being made by using a connection means; (Fig. 1)
- moving the end portion of the second connection conductor to a position outside the plane of the frame and opposite a location for the second connection region of the semiconductor element (Fig. 4-5)
- making an electro-conductive connection between the second connection region and the end portion of the second connection conductor by using a connection means, characterized in that the end portion of the second connection conductor within the

frame is positioned outside the extension of the first connection conductor and is brought to a position opposite the position for the second connection region of the semiconductor element by bending along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion. (Fig. 4-5)

Regarding claim 5.

A method as claimed in claim 4,
characterized in that the end of the end portion of the second connection conductor is bent through approximately 90 degrees along the bending axis out of the plane of the frame, and the end of the end portion is bent, along a further bending axis extending substantially parallel to the bending axis and at a distance therefrom corresponding approximately to the thickness of the semiconductor element, through an angle of approximately 90 degrees to the position of the semiconductor element (Fig. 3-5)

Regarding claim 6.

A method as claimed in claim 5,
characterized in that the end portion of the second connection conductor is bent along the further bending axis or along another bending axis in such a manner that said end portion extends obliquely in at least one direction with respect to the end portion of the first connection conductor which contains the position for the semiconductor element (Fig. 3-5)

Regarding claim 7.

A method as claimed in claim 4,
characterized in that the semiconductor element is slid between the connection
conductors after the end portion of the second connection conductor has been bent to a
position opposite the location for the second connection region of the semiconductor
element and opposite the end portion of the first connection conductor, the element
being clamped between the connection conductors. (column 4 lines 10-25)

Regarding claim 9.

A method as claimed in claim 3,
characterized in that before the semiconductor element is slid between the connection
conductors, the end portion of the first connection conductor is maintained in a
depressed position by means of a pressure member, until the semiconductor element
has been slid between the connection conductors. (column 4 lines 10-25)

Regarding claim 10.

A device for manufacturing a semiconductor device the device comprising:
- a transport mechanism (2) for a lead frame with at least two freely extending
connection conductors (Fig. 1-5 column 3 lines 1-25)
-positioning means for positioning a semiconductor element (Fig. 1-5 column 4 lines 10-
25)
- pusher means for pushing the semiconductor element in between the two

connection conductors of which one is bent to a position above the position of the other one (Fig. 1-5 column 4 lines 10-25, 50-60),

means for bending an end portion of at least one of the connection conductors along a bending axis which makes an oblique angle with the longitudinal axis of the end portion. (Fig. 4-5 column 4 lines 10-35)

Regarding claim 11.

A device as claimed in claim 10,

which further comprises means for bending an end portion of at least one of the connection conductors along a bending axis which makes an oblique angle with the longitudinal axis of the end portion. (Fig. 4-5 column 4 lines 10-35)

Regarding claim 12.

A device as claimed in claim 10,

characterized in that it comprises pressure means for pressing downward one of the conductor tracks during the pushing against the semiconductor element (Fig. 1-5 column 2 lines 55-65)

Regarding claim 13.

A semiconductor device comprising:

- a semiconductor element which is provided with a first and a second electric connection region, which connection regions are situated on opposite sides of the

semiconductor element (Fig. 1-5 column 3 lines 5-20)

- a first connection conductor having a contact, and facing away therefrom, an end portion which is electro-conductively connected to the first connection region (Fig. 1-5 column 3 lines 15-20)

- a second connection conductor having a contact, and facing away therefrom, an end portion which is bent along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion, such that the end portion is situated opposite the second electric connection region, with which it is electro-conductively connected, while the contact is situated in the same plane as the contact of the first connection conductor, the end portion having a further bent region in contact with the second electric connection region and having a length that corresponds approximately to the thickness of the semiconductor element (Fig. 1-5 column 3 lines 45-65 column 4 lines 1-30)

an isolating envelope which leaves contacts facing way from the end portions of the connection conductors uncovered. (Fig. 1)

Regarding claim 15. A semiconductor device as claimed in claim 13, characterized in that:

- the semiconductor element is a semiconductor transistor with a third connection region (Fig. 1-5 column 3 lines 45-65 column 4 lines 1-30)

- a third connection conductor is present, which has a contact, and facing away therefrom, an end portion which is bent along a bending axis which is at an oblique

angle with respect to the longitudinal axis of the end portion, such that the end portion is situated opposite the third electric connection region, with which it is electro-conductively connected, while the contact is situated in the same plane as the contact of the first connection conductor;(Fig. 1-5 column 3 lines 45-65)

- the second and the third connection conductor are situated on either side of the first connection conductor (Fig. 1-5 column 3 lines)

Regarding claim 16, A semiconductor device as claimed in claim 13, or a lead frame as claimed in claim 1, characterized in that the first connection conductor is provided with a hole at a distance from the position for the semiconductor element. (Fig. 5)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 8 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coldren (U.S. Patent 4252864) as applied to claim 13 above in view of Sakamoto et al. (U.S. Patent 6975022).

Regarding claim 8. Coldren discloses:

A method as claimed in claim 3, characterized in that

- a lead frame is chosen in which the first connection conductor is provided with a hole at a distance from the position of the semiconductor element (Fig. 5)

Coldren discloses the claim except for the semiconductor element being placed on the hole and fixed by means of a suction device and the pushing means.

Sakamoto discloses:

- the semiconductor element (15) is placed on the hole and fixed by means of a suction device (24, V) present below the hole, after which the semiconductor element is pushed between the connection conductors by means of a pusher member (Fig. 1-5-11 column 8 lines 30-60 column 9 lines 10-15)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to implement a suction device, and a pusher member as taught by Sakamoto, since Sakamoto states at column 8 lines 30-60 that such a modification would aid in mounting and fixing the semiconducting device.

Regarding claim 14.

A semiconductor device as claimed in claim 13, characterized in that:

Sakamoto discloses:

-the semiconductor element is a semiconductor diode (Fig. 1-5-11 column 12 lines 9-11)

Coldren discloses:

-The second connection conductor is u-shaped or j-shaped prior to bending (Fig. 4)

(and

-the contacts of the connection conductors are in line with one another (Fig. 1-5)

Coldren in view of Sakamoto discloses the claimed invention except for the oblique angle range of the lead frame. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use such a range, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

5. Applicant's arguments filed 3/27/2009 have been fully considered but they are not persuasive.

6. Applicant has argued:

The Office Action dated December 29, 2008 reopened prosecution with the following new grounds of rejection: claims 3-4, 9-10 and 12 stand rejected under 35 U.S.C. § 112(1); claims 1-2 stand rejected under 35 U.S.C. § 102(b) over Heinlen (U.S. Patent No. 3,736,367); claims 3-7, 9-13 and 15 stand rejected under 35 U.S.C. § 102(b) over Coldren (U.S. Patent No. 4,252,864); and claims 8 and 14 stand rejected under 35 U.S.C. § 103(a) over the '864 reference in view of Sakamoto (U.S. Patent No. 6,975,022). The Office Action also notes an objection to the drawings. Applicant traverses all of the rejections and, unless explicitly stated by the Applicant, does not acquiesce to any objection, rejection or averment made in the Office Action.

The § 102(b) rejections over the '367 reference are improper because the reference does not disclose, and the Office Action has not asserted, the claimed first and second conductors that secure and electrically connect a semiconductor element on opposite sides thereof, nor does the '367 reference disclose connectors that secure a semiconductor element via secure bending (as established in the record). Referring to Figure 5 of the '367 reference (copied below for convenience), the asserted "first (6, 18, 24)" and "second (10, 18, 24) connection conductor" are not respectively located on opposite sides of any semiconductor element and are not configured to do so. Rather, the cited contact arms bend to secure an upper portion of a semiconductor chip (i. e., arms 20 extend over and connect to a common (upper) side of a chip, as shown in Figure 5 below). Furthermore, the underside of the chip is located upon a heat sink 26, which does not make electrical contact as claimed, as is consistent with the discussion at column 2:55-65.

This argument is moot considering the claim has been amended and the rejection changed.

Accordingly, the cited portions of the '367 reference do not disclose a lead frame or any arrangement that makes electrical contact to opposite sides of a semiconductor element. As also established in the record, the '367 reference does not disclose connection conductors bent at oblique angles. Accordingly, Applicant believes that the § 102(b) rejections over the '367 reference are improper and should be removed.

Further regarding the § 102(b) rejections of claims 1 and 2, Applicant submits that the Office Action's failure to give patentable weight to limitations following the terms "adapted to" is contrary to the M.P.E.P. and the case law cited in the Office Action (*In re Hutchinson*). In this instance, *In re Hutchinson* is distinguishable because "adapted to" was part of an intended use clause found in the preamble of the claim. Other cases support the view that "adapted to" clauses in claims further limit the claimed subject matter and should not be disregarded. See, e.g., *In re Venezia*, 530 F.2d 956, 958-59 (CCPA 1976), *Pac-Tec Inc. v. Amerace Corp.*, 903 F.2d 796, 801 (Fed. Cir. 1990). Notwithstanding this, Applicant believes that further discussion of the terms "adapted to" is unnecessary as the terms are no longer present in the claims.

The § 102(b) rejections of claims 3-7, 9, 10-13 and 15 over the '864 reference are improper because the Office Action has provided no explanation whatsoever as to correspondence between the cited disclosure and specific claim limitations, and Applicant cannot ascertain any such correspondence. For instance, the Office Action cites all of figures 1-5 and the entirety of column 4 of the '864 reference, but provides no explanation as to which of the multiple portions of the assemblies shown in the figures would correspond to specific claim limitations. Applicant has reviewed these cited portions and cannot ascertain any disclosure of first and second non-engaging end portions that electrically connect to opposite sides of a semiconductor element. Referring to Figures 4 and 5 by way of example, it appears that the lower supporting region 34 is a central portion of the lead frame that is engaged to carrier strips 30 and 32 at opposing ends.

Carrier strips 30 and 32 do not resemble nor are ascertained to be “end portions”. One example of non-engaging end portions connecting to opposite sides of a semiconductor element is the contact area of the underside of the chip 24 and the contact end 74. the reference clearly states that 74 is a “contact end”.

In addition, while the end portions 62 and 74 are not engaged, they both connect to the same side of a chip (see, e.g., Figure 5 above, showing end portion 62 extending into an opening 70 in end portion 74). Accordingly, the lower support structure 34 is engaged at both ends, and the cited portions of the '864 reference do not provide correspondence to the claims as asserted. The cited portions of the '864 reference also fail to provide correspondence to other claim limitations, such as those in claim 5 (and relative to claim 13) directed to specific limitations characterizing the bends of the connection conductors (respective portions bent at 90 degrees along an out-of-plane bending axis, with an end of the conductor corresponding to the thickness of a semiconductor element again bent through 90 degrees). For further explanation as to the lack of correspondence to these and other dependent limitations, Applicant refers the Examiner to Applicant's prior responses of record (as largely unaddressed in the instant Office Action), which are fully incorporated herein. Applicant therefore requests that the § 102(b) rejections of claims 3- 7, 9, 10-13 and 15 be removed.

The limitations that applicant asserts are unaddressed actually extend from the figures, in that, in order for the portions of the conductor to have the resultant bend, they would have to go through the bends that are claimed in claim 5. With regards to claim 13, it is unclear as to which 90 degree bend limitation the applicant is referring.

The § 103(a) rejection of claims 8 and 14 over the '864 reference in view of the '022 reference are also improper for reasons stated above, and further because the cited references fail to provide correspondence to claims 8 and 14 as asserted. As the Office Action has (again) cited to multiple figures and discussion without providing a clear explanation as to which portions of the references discuss limitations (i. e., those directed to a hole and to a pusher member), Applicant has reviewed the references but cannot ascertain (operable) disclosure of various claim limitations. For instance, the cited portions of columns 8 and 9 of the '022 reference do not appear to discuss any pusher member or moving any semiconductor element. Rather, it appears that the '022 reference holds member 30 in place by vacuum suction and secures that member without moving it (see, e.g., column 9:15-21). Accordingly, neither reference discloses moving a semiconductor element with a pusher member as claimed. In addition to the above, the § 103(a) rejection of claims 8 and 14 are also improper because the '022 reference teaches away from moving a semiconductor element in order to fix member 30. As consistent with M.P.E.P. § 2143.01 and relevant case law, where a reference teaches away from the asserted combination of teachings, and where the proposed modification further undermines the purpose or operation of the reference, there is no motivation to combine the references as asserted. See, e.g., KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1741 (U.S. 2007) ("when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious"), and In re Gordon 733 F.2d 900 (Fed. Cir. 1984) (A § 103 rejection cannot be maintained when the asserted modification undermines purpose of the reference). As the '022 reference teaches fixing member 30 in place, moving the member as suggested in the Office Action directly contradicts the purpose and teachings of the ~022 reference. Therefore, the proposed combination of the '864 and '022 references does not provide correspondence to the limitations in claims 8 and 14, there is no motivation to combine the references as asserted, and the references further suggest that the claimed invention is non-obvious. Accordingly, the § 103(a) rejection is improper and should be removed.

Applicant's arguments are not commensurate with applicant's claims. Claims 8 and 14 do not mention moving any semiconductor element as applicant is arguing. Moreover, the office action never mentions any movement at all. The suction device is clearly

explained and cannot be explained any further as it is in column 8 of the reference. With regards to a pusher member, the reference clearly states that "fixing the flat member 30 on the bonding table without causing the second bonding pad to deviate, bonding energy can be transferred to the bonding wire....", The word "push" can be defined to "press against forcefully without moving."

The §§ 112(1) and 112(2) rejections of claims 3, 4, 9, 10 and 12, based upon use of the term "means," are improper because the specification provides various examples to which the respective limitations may be applicable. For instance, regarding the term "pusher means," the specification provides explicit examples in the figures, with exemplary embodiments described at paragraphs 0018 and 0050, the latter of which describing a "pusher member" (e.g., a "leaf spring"). Regarding the term "pressure means," the specification also provides various examples, with exemplary embodiments described at paragraphs 0019 (functionally describing example pressure means) and 0047-0052 (e.g., pressure members 7 and 8). The term "positioning means" is supported in the figures (e.g., portions of the frame upon which a semiconductor element is positioned) and various portions of the specification including, for example, paragraph 0041 (e.g., "end portion 4A" and/or "(vacuum) tweezers"). Regarding the term ~connection means," the specification and figures again provide multiple exemplary embodiments, including those shown in Figure 1 and described at paragraphs 0041-0043 (e.g., "connection conductors 4, 5"). Accordingly, the §§ 112(1) and 112(2) rejections are without basis and should be removed. Regarding the objection to the drawings, Applicant has submitted replacement drawings herewith. Accordingly, Applicant believes that the objection is no longer applicable.

The examiner agrees and the 112 rejections and the drawing objection have been removed.

Applicant notes that claim 16 does not stand rejected in any statement of rejection. However, the Office Action discusses claim 16 in connection with the § 102(b) rejection of claims 3-7, 9-13 and 15 at page 12. While Applicant believes claim 16 to be allowable in view of the above, should any rejection of claim 16 be maintained, Applicant requests clarification and further requests that Applicant be afforded the opportunity to respond to any such rejection (as would be made in a non-final Office Action).

The office action summary (PTOL 326) clearly states that claim 16 is rejected. Furthermore, since the claim rejection was added at the end of a 102 rejection, there is absolutely no ambiguity as to how and where it was rejected and no question as to what reference was used in the rejection.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SWAPNEEL CHHAYA whose telephone number is (571)270-1434. The examiner can normally be reached on Monday- Thursday 9:30-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Richards can be reached on 571-272-1736. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SC

/N. Drew Richards/
Supervisory Patent Examiner, Art Unit 2895